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Editorial

EVAR fever: minimally invasive, maximally inclusive?

Open repair of abdominal and thoracic aortic aneurysm inevitably involves clamping and unclamping of this major vessel and, consequently, major haemodynamic perturbation. Experienced vascular anaesthetists and good teamwork can ameliorate the peaks and troughs of blood pressure and heart rate with appropriate use of vasoactive drugs, fluid therapy and anaesthesia itself. Such levels of proficiency can only be reached by thorough training and experience, both in volume and quality. In recent times, endovascular aneurysm repair (EVAR) has revolutionised vascular surgery such that this technique has markedly surpassed that of open repair in most centres, heralding a change in the professional landscapes for both surgeons and anaesthetists. Similar to performing laparoscopic procedures, surgeons are required to create three dimensional experiences from two dimension information, a skill that is vastly different to that required for open repair. Anaesthetists are still exposed to patients with significant co-morbidities attendant with vascular disease and, since the surgical trauma is markedly reduced, many patients who would not be considered able to tolerate the stress of open surgery are now being offered EVAR. What, then, are the implications of this developmental shift?

It would be prudent first to consider the current status of EVAR within the realm of aneurysmal surgery. Recent publications of large trials comparing open versus endovascular repair have produced a rather similar message: EVAR provides an early survival advantage over open repair, but this benefit is eroded over time so that equivalence is evident by around the two-year mark [1–3]. Endovascular aneurysm repair is now recommended as a treatment for unruptured infrarenal aortic aneurysm by the National Institute for Health and Clinical Excellence, although the same body provided conflicting results for cost effectiveness of this approach for each quality adjusted life year [4]. The need for a suitable landing zone proximal to the aneurysm for graft deployment represents an evolutionary obstacle that currently prevents EVAR from taking over from the open procedure entirely. However, with improved training and technology such as branched and fenestrated devices, and the use of hybrid procedures requiring extra-anatomical arterial anastomoses, increasingly more lesions will become amenable to EVAR. Therefore, the number of EVAR procedures will continue to rise, but a certain proportion of aneurysms will still require open repair and hence the skills of an experienced anaesthetist. Herein lies

the rub: how to maintain expertise with managing open repair in the face of dwindling exposure and, consequently, how to train the next generation?

The problem of maintaining expertise and training for complex cases in the light of reduced exposure is not confined to vascular anaesthesia since interventional radiological procedures have gained ground in other specialties including cardiac and neurosurgery. There are no simple solutions. We could choose to surrender to the forces of supply and demand: fewer open cases means fewer workers are required to develop and maintain the skill set. This naturally will propel us further down the road of subspecialisation of anaesthesia. All will be well if it wasn't for the inconvenience of the emergency abdominal aortic aneurysm (AAA), a significant portion of which would still require open repair at present. It would then be left to chance whether the on-call anaesthetist is  who is experienced in dealing with open AAA repair or not. For larger departments, this could in theory be dealt with by arranging the on-call system to balance out the spread of vascular expertise, though few departments would have this luxury. In areas of population density, there could be designated vascular surgery centres with a high throughput of cases.

Such 'centres of excellence' can attract resources for specialised endovascular operating theatres and may have sufficient workload to sustain a critical mass of vascular anaesthetists providing a full 24-hour service.

Further down the continuum of this same problem is the issue of training, with which one must be more circumspect. After all, the trainee must have adequate exposure to a range of cases to achieve competency as a Fellow of his/her respective College. Unlike what an economist may argue when a product supply is scarce but the demand high, anaesthetists do not have the option of increasing supply or reducing the demand for training. Rather, we have to rethink the whole issue of training when it comes to such cases, and as a specialty think of creative solutions to 'modify' the supply. Training alongside an experienced anaesthetist in a one-to-one situation, with the trainee actively participating in decision-making whilst delivering care to a patient, can well be considered a 'gold standard' of training. Naturally, this form of apprenticeship system would be difficult to sustain in an environment of limited cases and reduced working hours. One therefore should recognise the preciousness of open AAA repairs and ensure at least one trainee is attached to each case, so as not to squander these valuable training opportunities [5]. A subsequent step then may involve exposing two or more trainees to such 'designated' training cases, even though it may dilute the experience somewhat for each participant. No doubt this practice takes place infor-

mally in many departments, but formalising such an inclusive arrangement at a departmental or regional level would raise awareness of this training imperative across the specialty. One could make use of the ready availability of video technology nowadays and produce interactive educational material from live footage of cases. These could be integrated with simulator training scenarios to enhance the experience. To accomplish this would require time, resources and the dedication of clinicians with strong educational interests and skills. Thus we either need to make the teaching value of existing cases 'go around' further or substitute the best experience with a reasonable one. However, both the trainee and the trainer must acknowledge the limitations of such approaches, especially with regards to the non-technical aspects of anaesthetic care, that are best honed by managing actual cases under supervision. Vascular surgeons have already recognised this problem of training in their own camp and have advocated turning to simulation to augment their training, as well as calling for trainees to be sent to centres with adequate workload [6].

Another implication from the increasing number of EVAR is the need to re-evaluate the actual role of the anaesthetist. As surgeons surmount the learning curve, EVAR could appear remarkably straightforward from the surgical point of view, with low rates of primary conversion. However, anaesthetists must be cognisant of the fact that patients undergoing EVAR are not immune to some of the problems associated with open repairs, such as peri-


operative renal impairment [7], and we should do what we can to minimise potential damage [8]. Fewer intra-operative anaesthetic interventions are required, and local anaesthesia with sedation is now a feasible and increasingly popular option for this procedure. Emerging data support this, with quoted success rates of 75% using a 'local anaesthesia first' approach and a conversion rate to general anaesthesia of 7.6% in selected centres [9]. There is also accumulating evidence from retrospective analyses of large databases, attesting not only to the feasibility but perhaps some advantages of performing the procedure under local or loco-regional anaesthesia [10, 11]. The advantages, which include reduced morbidity, early mortality and ICU admission, seem particularly prominent in high-risk patients. One must bear in mind, though, that these are retrospective analyses with possible selection bias, and prospective randomised data are required to confirm these apparent benefits. Robust clinical trials of high-risk patients, comparing local anaesthesia with sedation versus general anaesthesia, are difficult to come by, as elegantly argued by Hutchinson in the case for transfemoral transcatheter aortic valve implantation in a recent editorial in *Anaesthesia* [12]. In the absence of confirmatory data, the anaesthetist has the pivotal role in navigating the patient through the decisional matrix for the choice for anaesthesia and, thereafter, to deliver the anaesthetic care by the chosen technique safely and smoothly.

A shift from general to local techniques with sedation does not

necessarily imply a downward shift of skills required. Though perhaps not considered as 'challenging' in the traditional sense, one must not underestimate the task of providing anaesthetic care to these patients using this technique. Rather, the anaesthetist should adopt a cautious and inclusive approach that involves a thorough evaluation and discussion with the patient and with the surgeon. After all, many of these patients are considered at high risk for open procedures or general anaesthesia. It should be remembered also that anaesthesia care does not just involve choice of drugs/technique but also pre-operative optimisation of co-morbidities and postoperative care. Furthermore, lessons learned from previous closed claims remind us of the devastating consequences of sedation gone wrong [13]. One must be aware of the anticipated duration of the procedure to decide whether it is reasonable to consider local anaesthesia with sedation. Surgeons need to be advised that patients may not be immobile for the entire time and they need to be comfortable with that for the given anatomy of the lesion. Simple patient factors, such as a persistent cough or a bad back that can make prolonged immobility intolerable, can render success using local anaesthesia difficult to achieve. Patients need to be informed that unawareness of the procedure may not be achievable, and agree to this before proceeding. In such circumstances it may be more appropriate to combine local anaesthesia with 'light' general anaesthesia with a supraglottic airway device. Thus much work has to be done for these

patients before entering the operating theatres.

Deep sedation is generally inadvisable for this setting, as co-operation is required for certain parts of the procedure, e.g. breath holding. Further, the ischaemic pain accompanying sheath insertion may not be alleviated by local anaesthesia alone, and dis-inhibition associated with deep sedation may make co-operation even more difficult to achieve. The use of opioids to alleviate the ischaemic pain may be required but these can cause synergistic respiratory depression. To this end, the α_2 -receptor agonist dexmedetomidine may be a useful choice, as it provides sedation with facilitated arousal, minimal respiratory depression and some analgesic effect [14]. This drug has now been launched in the UK, and has been used successfully elsewhere in this endeavour [15]. It has become the first choice sedative in our theatres, and is worthy of further evaluation for EVAR procedures in other local settings.

In the future, there could be more spic  introduced into the lives of vascular anaesthetists, with increasing numbers of emergency EVAR and hybrid procedures attempted. Patients' condition would typically be suboptimal in the case of the ruptured AAA, and the potential for haemodynamic disturbances are higher in the case of the hybrids. In the interim, those of us engaged in providing anaesthetic care for vascular procedures should adopt an 'inclusive' attitude on several fronts. With regard to the open repair, include as many juniors as practical to minimise the loss of skills in dealing with such cases, and consider

the creation and inclusion of more non-traditional approaches to training. The inclusion of the surgeon and the patient in the choice of anaesthetic technique is especially important if contemplating the use of local anaesthesia. Lastly, we should include and probably take greater ownership of the responsibility for medical optimisation of patients for these procedures. Comments such as "Use of optimal medical therapy was poor in the UK EVAR Trials" and "it seems likely that the high cardiovascular event rates seen in these patients could be reduced simply by a more rigorous application of medical therapy", made in a paper analysing cardiovascular events in EVAR [16], are particularly poignant to vascular anaesthetists who are in the ideal position to intervene on the patient's behalf. Apposite use of pre-operative clinics may not only have a favourable impact on vascular surgical outcomes in the short term [17], but enable otherwise 'missed opportunities' for secondary prevention of cardiac disease to be seized, thus augmenting our role as peri-operative patient advocates [18]. Therefore, as peri-operative physicians, perhaps we should shift our paradigm and consider that where we can make the most difference for these patients may lie outside the operating theatres.

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Competing interests

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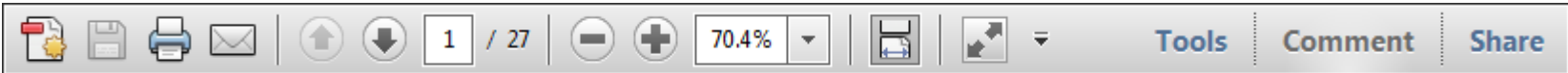
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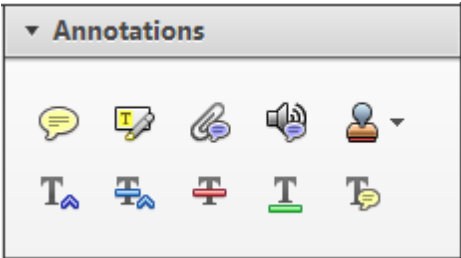
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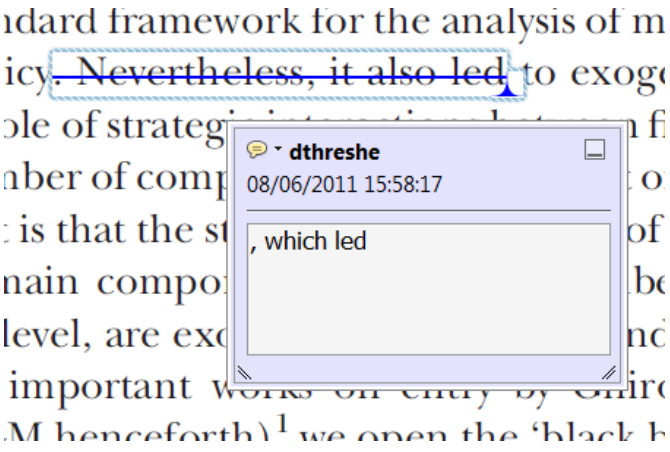
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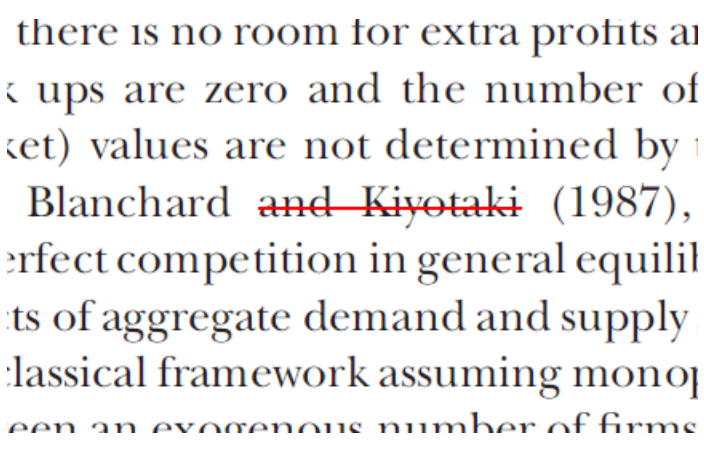
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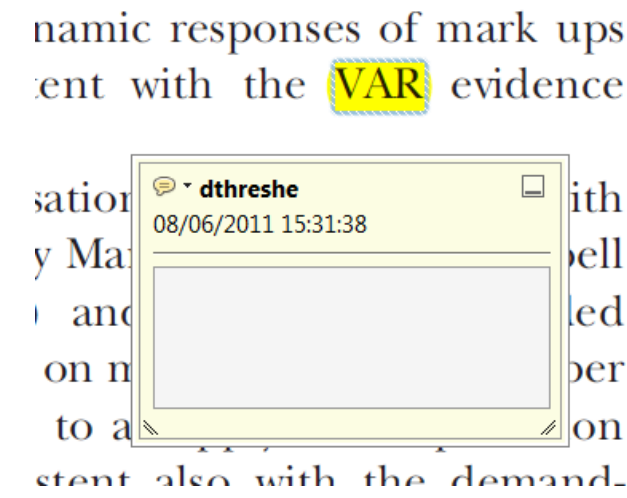
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
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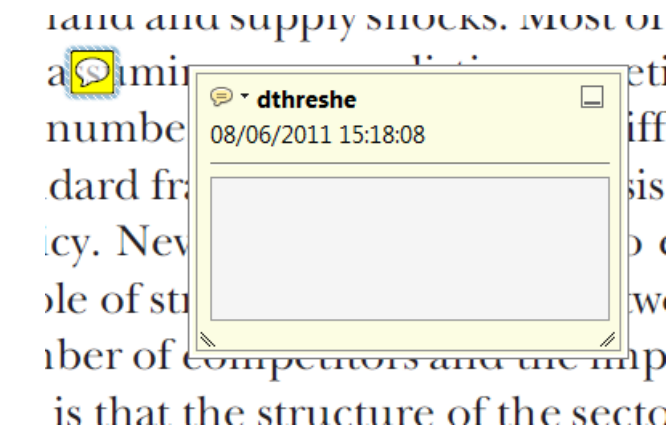
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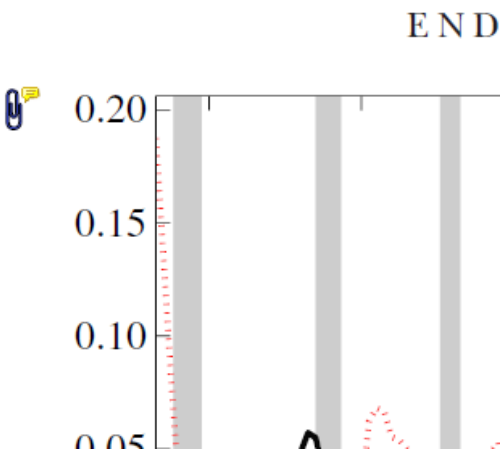


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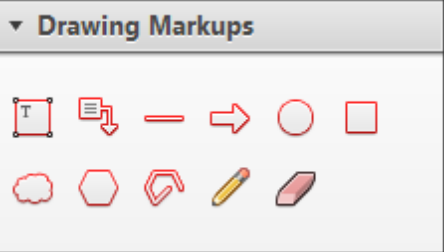
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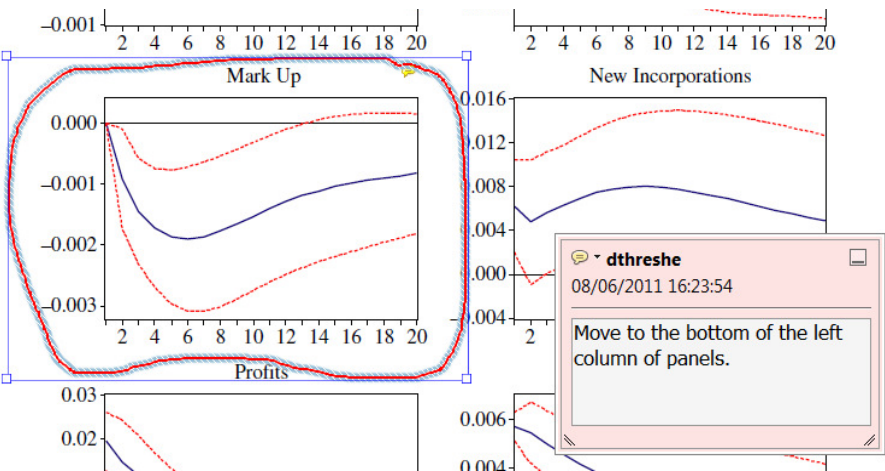


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